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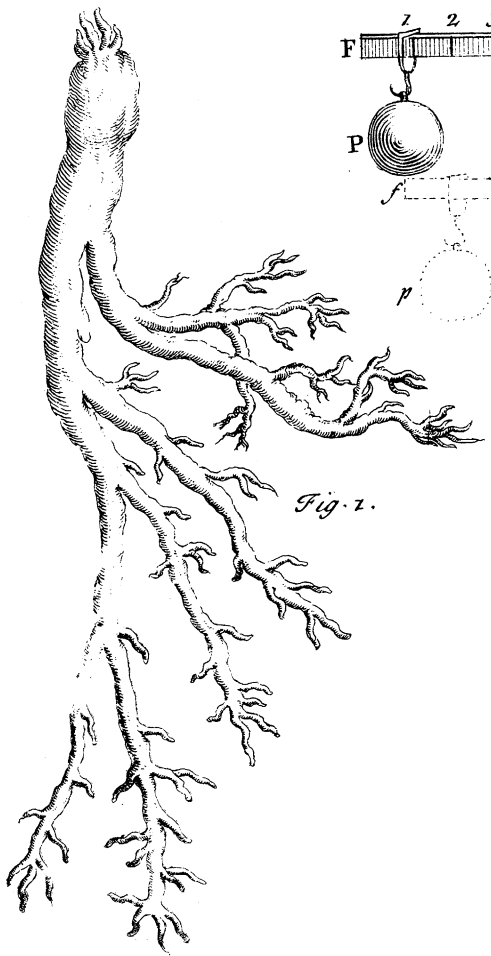

Fig. 1.

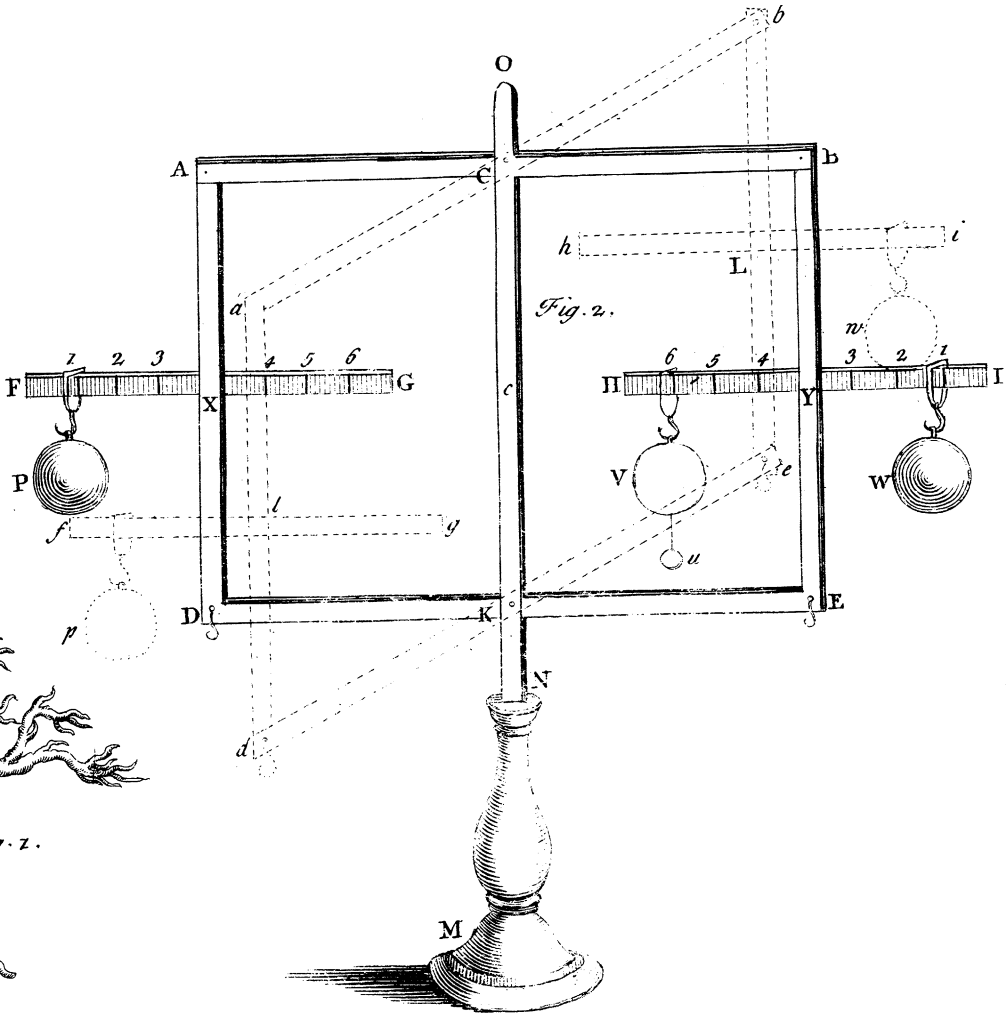

Fig. 2.

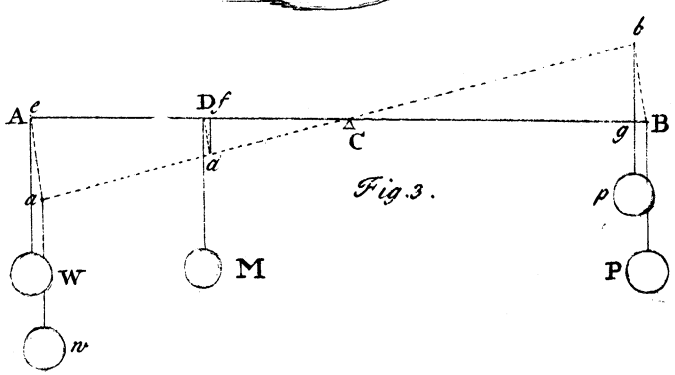

Fig. 3.

of the *Trachæa*, and afterwards concreted by the Heat of the Part. As this may ſerve to explain the remarkable Caſe of *Tulpius*, ſo I thought it worth being communicated to the Society. I am,

With great Reſpect,

June 17. 1731. *Your very humble Servant,*

FRANK NICHOLLS.

V. *An Account of an Experiment explaining a mechanical Paradox,* viz. *that two Bodies of equal Weight ſuſpended on a certain ſort of* Balance [*as in* Tab. Fig. 2.] *do not loſe their* Æquilibrium, *by being removed one farther from, the other nearer to the Center. By the Rev.* T. J. Deſaguliers, *L. L. D. & F. R. S.*

Propoſition.

IF the two Weights P,W, in Fig. 3. hang at the Ends of the Balance A B, whoſe Center of Motion is C; thoſe Weights will act againſt each other (becauſe their Directions are contrary) with Forces made up of the Quantity of Matter in each multiplied by its Velocity; that is, by the Velocity which the Motion of the Balance turning about C will give to the Body ſuſpended. Now the Velocity of an heavy Body is its perpendicular Aſcent or Deſcent, as will appear

by moving the Balance into the Poſition *a b*; which ſhews the Velocity of P to be the perpendicular Line *e a*, and the Velocity of B will be the perpendicular Line *b g*: For if the Weights P and W are equal, and alſo the Lines *e a* and *b g*, their *Momenta* made up of *e a* multiplied into W, and *b g* multiplied into P, will be equal, as will appear by their deſtroying one another in making an *Æquilibrium*. But if the Body W was removed to M, and ſuſpended at the Point D, then its Velocity being only *f d*, it would be over-balanc'd by the Body P; becauſe *f d* multiplied into M, would produce a leſs *Momentum* than P multiplied into *b g*.

As the Arcs A *a*, B *b*, and D *d* deſcribed by the Ends of the Balance or Points of Suſpenſion are proportionable to their Sines *e a*, *g b*, and *d f*, as alſo the *Radii* or Diſtances C A, C B, and C D; in the Caſe of this common ſort of Balance, the Arcs deſcribed by the Weights, or their Points of Suſpenſion, or the Diſtances from the Center may be taken for the Velocities of the Weights hanging at A, B, or D; and therefore the acting Force of the Weights will be reciprocally as their Diſtances from the Center.

SCHOLIUM.

The Diſtances from the Center are taken here for the Velocities of the Bodies, only becauſe they are proportional to the Lines *e a*, *b g*, and *f d*, which are the true Velocities. For there are a great many Caſes wherein the Velocities are neither proportionable to the Diſtances from the Center of Motion of a Machine, nor

nor to the Aris deſcribed by the Weights or their Points of Suſpenſion. Therefore it is not a general Rule, *that Weights act in Proportion to their Diſtances from the Center of Motion*; but a Corollary of the general Rule, *that Weights act in Proportion to their true Velocities*, which is only true in ſome Caſes. Therefore we muſt not take this Caſe as a Principle, which moſt Workmen do, and all thoſe People which make Attempts to find the *perpetual Motion*, as I have more amply ſhewn in the *Philoſophical Tranſaction*, N° 369.

But to make this evident even in the Balance, we need only take Notice of the following Experiment, Fig. 2. A C B E K D is a Balance in the Form of a Parallelogram paſſing thro' a Slit in the upright Piece N O ſtanding on the Pedeſtal M, ſo as to be movable upon the Center Pins C and K. To the upright Pieces A D and B E of this Balance are fix'd at right Angles, the horizontal Pieces F G and H I. That the equal Weights P, W, muſt keep each other in *Æquilibrio*, is evident; but it does not at firſt appear ſo plainly, that if W be removed to V, being ſuſpended at 6, yet it ſhall ſtill keep P in *Æquilibrio*; tho' the Experiment ſhews it. Nay, if W be ſucceſſively moved to any of the Points 1, 2, 3, E, 4, 5, or 6, the *Æquilibrium* will be continued; or if, W hanging at any of thoſe Points, P be ſucceſſively mov'd to D or any of the Points of Suſpenſion on the croſs Piece F G, P will at any of thoſe Places make an *Æqulibrium* with W. Now when the Weights are at P and V, if the leaſt Weight that is capable to overcome the Friction at the Points of Suſpenſion, C and K be ad-

ded to V, as *u*, the Weight V will overpower, and that as much at V as if it was at W.

From what we have ſaid above, the Reaſon of this Experiment will be very plain.

As the Lines A C and K D, C B and K E always continue of the ſame Length in any Poſition of the Machine, the Pieces A D and B E will always continue parallel to one another, and perpendicular to the Horizon: However, the whole Machine turns upon the Points C and K; as appears by bringing the Balance to any other Poſition, as *a b e d*: And therefore as the Weights applied to any Part of the Pieces F G and H I can only bring down the Pieces A D and B E perpendicularly, in the ſame Manner as if they were applied to the Hooks D and E, or to X and Y, the Centers of Gravity of A D and B E; the Force of the Weights (if their Quantity of Matter is equal) will be equal; becauſe their Velocities will be their perpendicular Aſcent or Deſcent, which will always be as the equal Lines 4 *l* and 4 L, whatever Part of the Pieces F G and H I the Weights are applied to. But if to the Weight at V be added the little Weight *u*, thoſe two Weights will overpower, becauſe in this Caſe the *Momentum* is made up of the Sum of V and *u* multiplied by the common Velocity 4 L.

Hence follows, that it is not the Diſtance *c* 6 multiplied into the Weight V, which makes its *Momentum*; but its perpendicular Velocity L 4 multiplied into its Maſs Q. E. D.

This is ſtill further evident, by taking out the Pin at K; for then the Weight P will over-balance the other

other Weight at V, becauſe then their perpendicular Aſcent or Deſcent will not be equal.

VI. *De Ingenti* Sanguinis Vomitu *perquàm* gelidiſſimis *brumali tempore* Potionibus *curato, Obſervatio ad Regiam Scientiarum Londinenſem Societatem à* Petro Antonio Michelotto *M. D. R. S. S. tranſmiſſa.*

QUUM Patritius Juvenis Præſtantiſſimus Ludovicus Maffetti, rure, ubi venatione, & perequitando ſe vehementer exercuerat, in urbem reverſus Sanguinem Decimo Calendas Januarias CIↃ ↃCC XXVIII. ad uncias quinque, ſexve matutinis temporibus vomeret, hujuſcemodi curationem inſtitui. Primùm, quòd Cruoris in Arterias, Venaſque vim, eas diſtendere continenter nitentem inſigniter, & præcipuè ex ſuperfluente Sanguineæ materiæ copia adauctam animadverterem; minimèque ignorarem ipſum Nobiliſſimum Juvenem laborare ſcyrrhoſo lienis tumore, ob quem, & Sanguinem vel hos ante quatuor annos evomuerat, & narium copioſis hæmorrhagiis à prima uſque adoleſcentia vere, & autumno quotannis tentari conſueverat; quæ, poſteaquam fortuitò à luſoribus follis capiti impactus fuerat, ferè ex toto defecerant; quòd hæc, inquam, minimè ignorarem, ad uncias circiter octo ex hæmorrhoidibus Sanguinem per hirudines protinus mitti, ejus copiæ demendæ, atque à liene, & ventriculo avertendæ cauſa præcepi; tùm aquam ex

plan-